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10/720,173

11/25/2003

Eun-Bong Han

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EXAMINER

LIANG, LEONARD S

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 11/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/720,173

Applicant(s)

HAN, EUN-BONG

Examiner

Leonard S. Liang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6,8-11,19,20,24,25 and 31 is/are rejected.
- 7) ☒ Claim(s) 3, 5, 7, 12-18, 21-23, and 26-30 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 4, 6, 8, 24-25, and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by the applicant's admitted prior art.

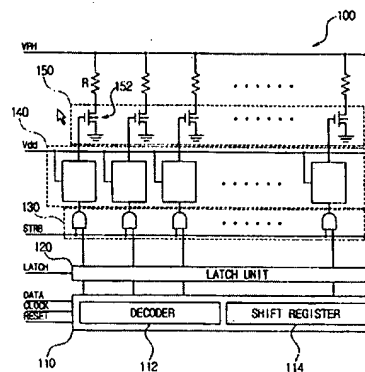
The applicant's admitted prior art discloses:

- {claim 1} An inkjet printer head driving apparatus having a plurality of heating elements and nozzles (figure 1, reference 100); a switching unit turning on and off each of the heating elements to heat ink corresponding to selected nozzles to eject the ink (figure 1, reference 150); a level shift unit having a level converter converting a potential level of a signal inputted therein into a predetermined potential level to drive the switching unit (figure 1, reference 140), a buffer to output the converted level of the signal (figure 2, reference 144), and a transient time extending part provided with at least one time extending element to extend by a predetermined time a transient time of the output potential level of the signal during which the potential level of the signal inputted from the level converter to the switching unit is converted from a first signal level to a second signal level and vice versa (figure 1-2, reference 140); a control unit receiving an external

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data signal, decoding the received data signal, and outputting the decoded data signal as a nozzle selection signal to the level shift unit to select the selected nozzles corresponding to a to-be-recorded image from the nozzles (figure 1, reference 110)

FIG. 1  
(PRIOR ART)



- {claim 4} wherein the transient time extending part comprises a first inverter inverting the signal outputted from the level converter (figure 2, reference INV1); and a second inverter extending the transient time from the first signal level to the second signal level or a second transient time from the second signal level to the first signal level in correspondence to an output signal of the first inverter (figure 2, reference INV2)
- {claim 6} A control method of an inkjet printer head driving apparatus having a switching unit driving heating elements corresponding to selected nozzles to eject ink through selected nozzles (figure 1, reference 150); outputting a nozzle selection signal to select nozzles corresponding to a to-be-recorded image out of the plural nozzles; receiving an inputted signal corresponding to the nozzle selection signal and converting a level of the inputted signal to a predetermined

potential level to drive the switching unit, and outputting the converted level of the inputted signal; extending a transient time of the output level of the inputted signal by a predetermined time in accordance with an output signal generating when the level of the inputted signal is converted, the transient time being a time period during which the level is converted from a first signal level to a second signal level and vice versa; and driving the heating elements corresponding to the selected nozzles to eject the ink through the selected nozzles based on the output signal from the transient time extending operation (figure 1-2, reference 140; Specification paragraph 0006-0014)

- {claim 8} An inkjet printer head driving apparatus having a plurality of heating elements and nozzles (figure 1, reference 100); a control unit generating a control nozzle selection signal to select a heating element and a nozzle corresponding to an image to be printed (figure 1, reference 110); a level shift unit generating a first nozzle selection signal having a first transient time, during which a level of the first nozzle selection signal is changed between first and second levels, in response to the control nozzle selection signal, and generating a second nozzle selection signal having a second transient time extended by a period from the first transient time of the first nozzle selection signal (figure 1-2, reference 140); and a switching unit turning on and off the heating element according to the second nozzle selection signal (figure 1, reference 150)
- {claim 24} wherein the switching unit comprises an FET, and a turning-on time of the FET is delayed by the period during which the first transient time of the

first nozzle selection signal is extended to the second transient time of the second nozzle selection signal, to provide a sufficient time to charge and discharge a parasitic capacitance around the FET (figure 1, reference 152; specification paragraph 0006-0014, 0020)

- {claim 25} wherein the control nozzle selection signal comprises on and off signals to turn on and off the switching unit corresponding to the heating element, the level shift unit comprises a level converter to convert the control nozzle selection signal into the first nozzle selection signal having the first and second levels which are different from the on and off signals in signal level respectively (paragraph 0006-0025)
- {claim 31} An inkjet head driving unit (figure 1); a control unit to generate a nozzle selection signal to select a nozzle having a heating element (figure 1, reference 110); a level shift unit to convert the nozzle selection signal to have a predetermined level to drive the heating element between a logic high and a logic low and having a buffer to output the converted nozzle selection signal (figure 2, reference 144), and one or more logic units to increase a time required to change the output nozzle selection signal between the logic high and the logic low (figure 1-2, reference 140); and a switching unit to turn the heating element on and off according to the output of the level shift unit (figure 1, reference 150)

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 9-11, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Hiwada (US Pat 6273537).

The applicants admitted prior art discloses:

- {claim 2} The inkjet printer head driving apparatus (as applied to claim 1 above)
- {claims 9-11} The inkjet printer head driving apparatus (as applied to claim 8 above)
- {claim 10} wherein the switching unit comprises a transistor having a first terminal coupled to the level shift unit, a second terminal coupled to the heating element, and a third terminal connected to a potential, and the residual voltage of the switching unit is a voltage of the first terminal (figure 1, reference 150)
- {claim 19} The inkjet printer head driving apparatus (as applied to claim 8 above); the first nozzle selection signal comprises a previous first nozzle selection signal and a current first nozzle selection signal, and the second nozzle selection signal comprises a previous second nozzle selection signal and a current second nozzle selection signal corresponding to the previous first nozzle selection signal and the current first nozzle selection signal of the first nozzle selection signal, respectively, and the voltage of the switching unit is a residual voltage remaining in the switching unit when the switching unit is turned off

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according to the previous second nozzle selection signal (specification paragraph 0006-0025)

- {claim 20} The inkjet printer head driving apparatus (as applied to claim 8 above); wherein the voltage of the switching unit is another residual voltage remaining in the switching unit when the switching unit is turned off according to the current second nozzle selection signal (specification paragraph 0006-0025)

The applicant's admitted prior art differs from the claimed invention in that it does not disclose:

- {claim 2} a discharging part discharging a residual voltage of a signal inputted from the level shift unit to a gate of the switching unit if the switching unit switching on and off the heating elements is turned off
- {claim 9} a discharging part discharging a residual voltage of the switching unit according to the first nozzle selection signal and/or the second nozzle selection signal
- {claim 10} the switching unit comprises a transistor having a first terminal coupled to the discharging part
- {claim 11} the discharging part is coupled to the level shift unit to receive the first and second nozzle selection signal so that the residual voltage of the switching unit is discharged according to at least one of the first transient time of the first nozzle selection signal and the second transient time of the second nozzle selection signal when the switching unit is turned on and/or off according to the second nozzle selection signal



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Hiwada et al discloses, with respect to claims 2 and 9-11, a discharging part attached to a print head drive circuit (figure 7, reference 3; column 7, lines 65-67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Hiwada et al into the invention of the applicant's admitted prior art. The motivation for the skilled artisan in doing so is to gain the benefit of discharging the current that flows through the level shift unit. The combination naturally suggests:

- {claim 2} a discharging part discharging a residual voltage of a signal inputted from the level shift unit to a gate of the switching unit if the switching unit switching on and off the heating elements is turned off
- {claim 9} a discharging part discharging a residual voltage of the switching unit according to the first nozzle selection signal and/or the second nozzle selection signal
- {claim 10} the switching unit comprises a transistor having a first terminal coupled to the discharging part
- {claim 11} the discharging part is coupled to the level shift unit to receive the first and second nozzle selection signal so that the residual voltage of the switching unit is discharged according to at least one of the first transient time of the first nozzle selection signal and the second transient time of the second nozzle selection signal when the switching unit is turned on and/or off according to the second nozzle selection signal

***Allowable Subject Matter***

Claims 3, 5, 7, 12-18, 21-23, and 26-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 3, 5, 7, 12-18, 21-23, and 26-30 disclose subject matter, which was not found, taught, or disclosed in the prior arts.

***Response to Arguments***

Applicant's arguments filed 10/20/06 have been fully considered but they are not persuasive.

The applicant's amendments to the claims have not added any limitations, which would change the status of the current rejection. For example, the applicants added a limitation about a buffer. However, the applicant's admitted prior art clearly discloses a buffer (figure 2, reference 144). Also, the applicant added language relating transient time to an output level. However, it was always the transient time of the output level that was being extended. All these amendments did, was state explicitly, what was already naturally implied by the applicant's admitted prior art.

The applicant's amendments and arguments have not addressed the main issue previously raised by the examiner. As a reminder, the examiner previously asserted, "In figure 6, the applicant has divided transient time extending part 243 into a left part (first inverter 244) and a right part (second inverter 245). The second inverter 245 consists of first PMOS 245a, second PMOS 245b, first NMOS 245c, second NMOS 245d. The applicant will appreciate that the left part of buffer 144 of the applicant's admitted prior art is identical to the first inverter 244 of

figure 6. Therefore, what needs to be compared is the right part of buffer 144 with second inverter 245. Although the right part of buffer 144 does not disclose a second PMOS and second NMOS, it does disclose a first PMOS and first NMOS. What this means is that figure 2 does perform some function of extending transient time, although the extent of this function may be minimal or even negligent when compared to the time extending characteristics of transient time extending part 243." The applicant has not rebutted this argument. The examiner's argument is basically that the right part of buffer 144 in the applicant's admitted prior art (which corresponds to applicant's transient time extending part 243) may not extend time to the same extent as the time extending part in figure 6 (since it lacks a second PMOS and NMOS), but it must extend time at least a little (because it does have a first PMOS and NMOS). Because, the claimed invention gives no bounds concerning the extent to which time is extended, this little bit of time extension is sufficient to read on the claimed invention. In order to overcome the examiner's rejection, the applicant must either give some sort of quantifiable boundaries to the extent of the time extension, or the applicant must explain to the examiner how a first PMOS and NMOS plus a second PMOS and NMOS can extend time, but a first PMOS and NMOS by itself can have no time-extending properties whatsoever. Based on the current language of the claimed invention, even a small amount of transient time extension is sufficient to read on the claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard S. Liang whose telephone number is (571) 272-2148. The examiner can normally be reached on 8:30-5 Monday-Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

10/27/06

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SUPERVISORY PATENT EXAMINER